

TACOM

3 Dimensional

Lethality, Survivability, Mobility and
Sustainment for America's Army

Solid Model

Technical Data

Packages

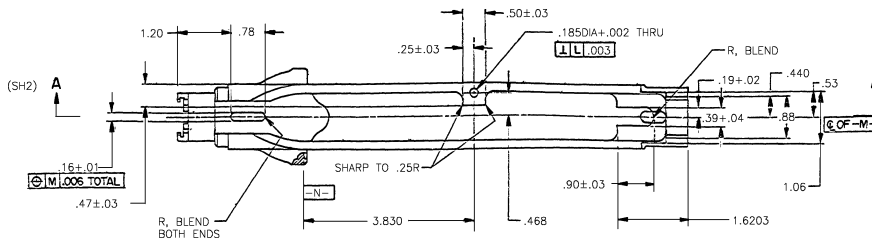
ARDEC

Configuration Mgt and LifeCycle Integration

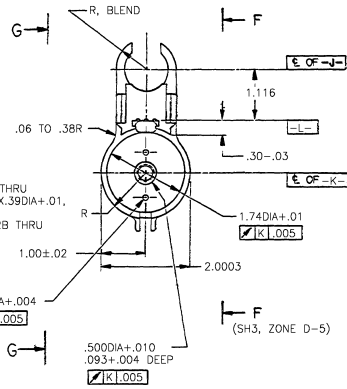
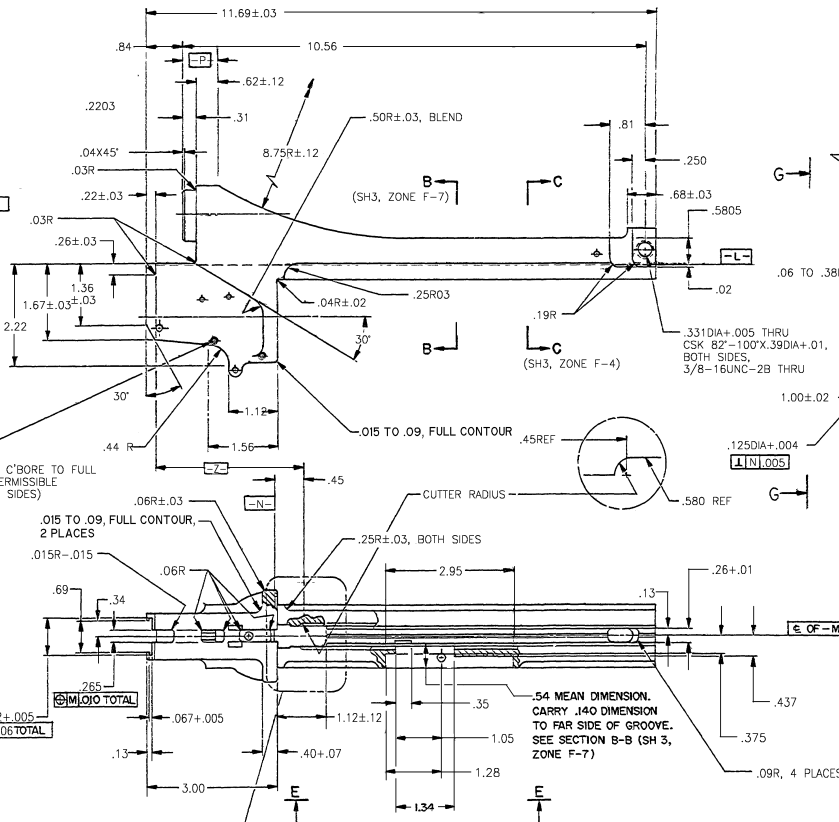
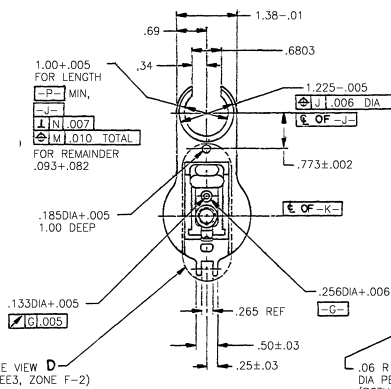
Jeff Windham DSN 782-8162
Windhamj@ria.army.mil

NOTES:

1. FINISH $\sqrt{}$ UNLESS OTHERWISE SPECIFIED.
2. ALL EDGES SHALL BE BROKEN .005+.010 UNLESS OTHERWISE SPECIFIED.
3. INSIDE CORNER RADII .015-.010 UNLESS OTHERWISE SPECIFIED.
4. MATERIAL: FORGING ALUMINUM
ALLOY 6151 TEMPER T6,
SPEC QQ-A-367.
ALTERNATE, ALUMINUM ALLOY, TEMPER T73,
QQ-A-200/II.
5. FINAL PROTECTIVE FINISH:
ANODIC FILM, TYPE III, CLASS 2,
MIL-A-8625. SEAL IN 1 1/4% AQUEOUS
SOLUTION OF NICKEL ACETATE AT 180°F
FOR 10 MINUTES. COLOR BLACK NO. 37038
TO DARK GRAY NO. 36081 OF FED-STD-595.
6. MIL-W-13855 APPLIES.
7. APPLY BAR CODE
LABEL AS SHOWN IAW TECHNICAL PURCHASE DESCRIPTION/
SPECIFICATION- U.S. ARMY SMALL ARMS WEAPON LABEL.



REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
W	NOR G553092 950831 (ECP G553093 950831)	951127	TPT
Y	NOR G559008 950929	960521	RLV
AA	NOR L853013 980407	980506	JB



AA	P	AA
SHT 1	SHT 2	SHT 3
REVISION STATUS OF SHEETS		

CURRENT DESIGN ACTIVITY CASE CODE 19000
U.S. ARMY
ARMAMENT RESEARCH DEVELOPMENT AND ENGINEERING CENTER
PICATINNY ARSENAL NEW JERSEY 07806-5000

PART NO. 8448338

DEPT OF THE ARMY
ROCK ISLAND ARSENAL ROCK ISLAND ILL. 61201

RECEIVER

THIS SIZE CODE IDENT NO.
F 19204 8448338

SCALE 1/1 UNIT WT SHEET 1 OF 3

MECHANICAL PROPERTIES		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		ORIGINAL DATE OF DRAWING	
TH		TOLERANCES ON	FINISH	DATE	BY
TS		ALL DIMENSIONS	SEE NOTE 4	1 AUG 69	W. J. C. / J. H. C.
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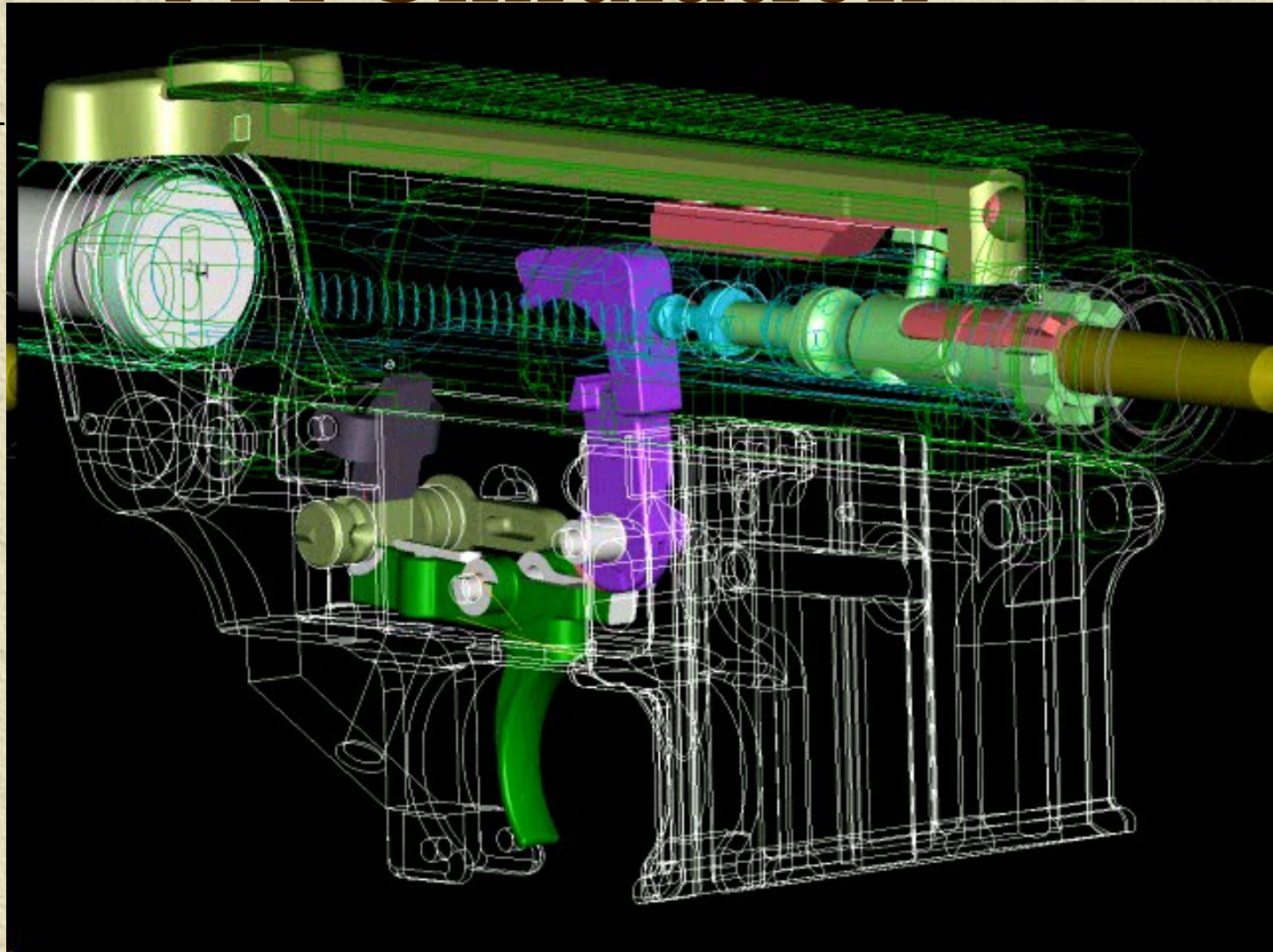
M9 Pistol Cutaway



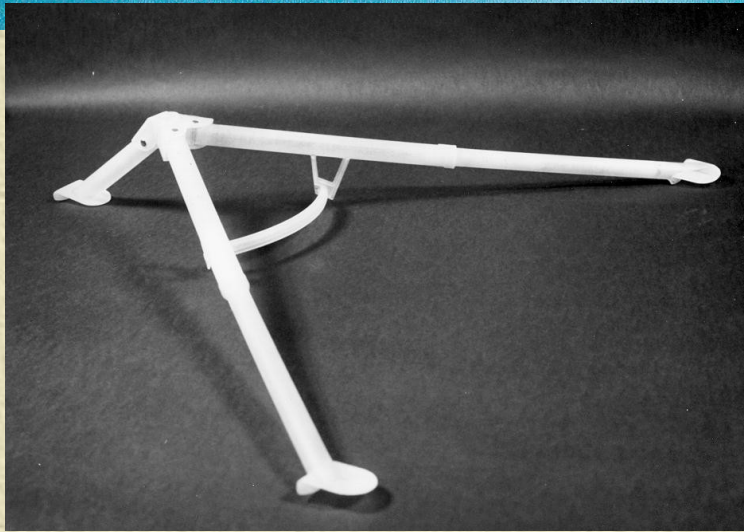
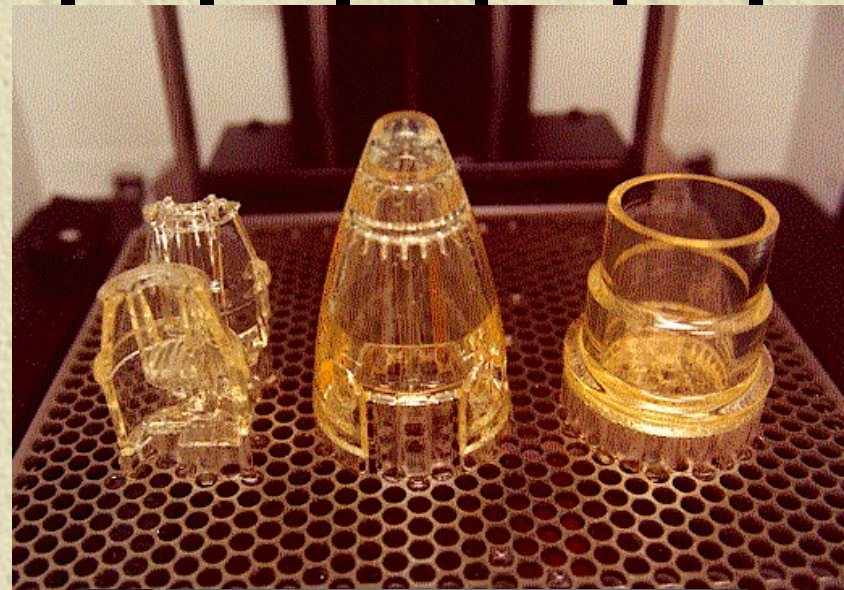
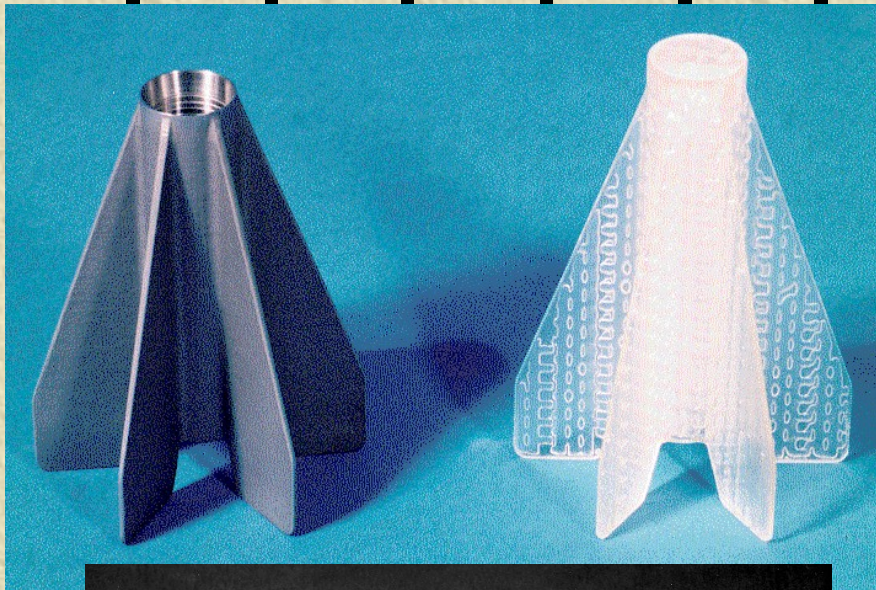
3D SOLID MODEL TDP's

- ✦ **Goal: To transform our technical data system based on 2-D raster images of line drawings, to a system based on 3-D solid models.**
- ✦ **Build infrastructure so that 3-D tech data can be used for production, design interface and upgrades, logistics support, etc.**

M4 Simulation



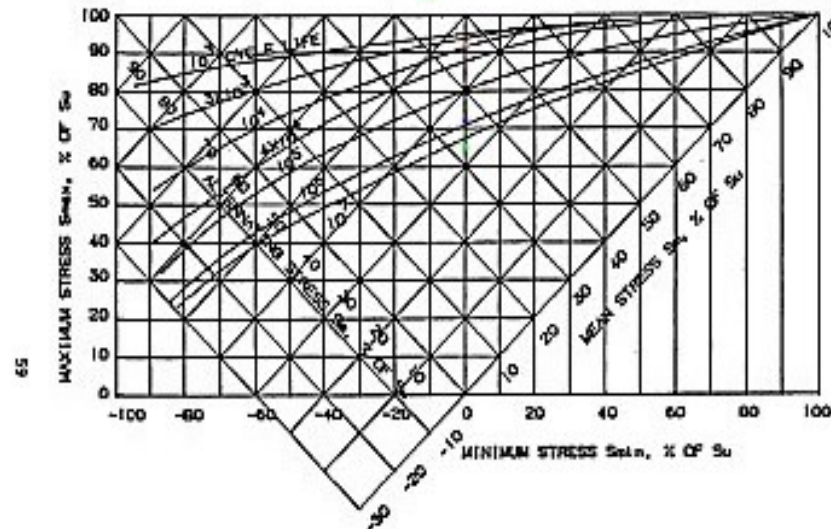
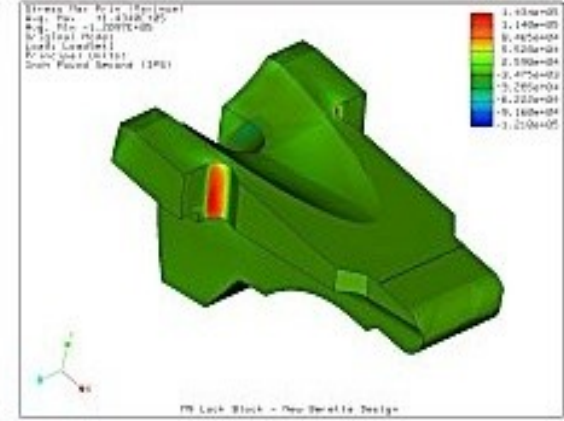
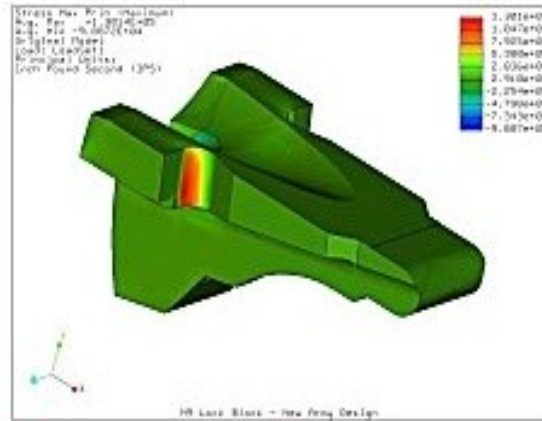
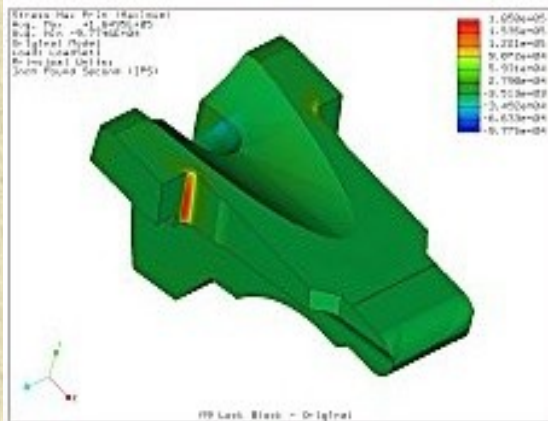
Rapid Prototype



Containerized Maintenance Facility



Engineering Analysis

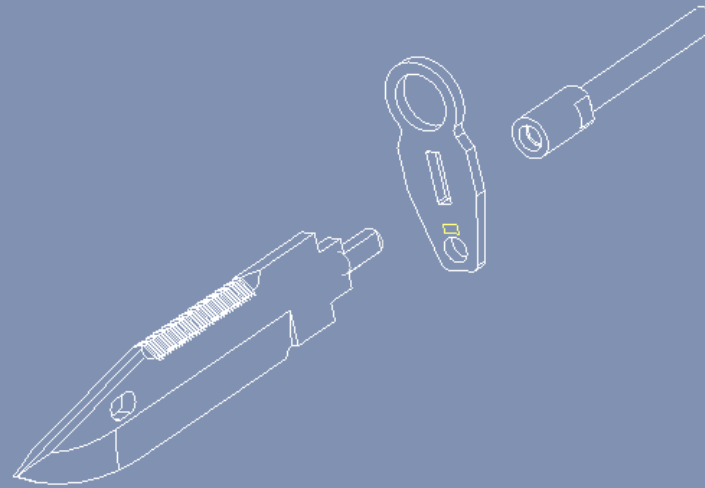


3D SOLID MODELS ALLOW AUTOMATED CREATION OF TECHNICAL MANUAL PAGES

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1		NONE	19200	12598163	BLADE	1
2		NONE	19200	12598164	GUARD	1
3		NONE	19200	12598165	ROD, TANG EXTENDING	1

SCALE : 0.700 TYPE : ASSEM NAME : 19200_12598166 SIZE : A

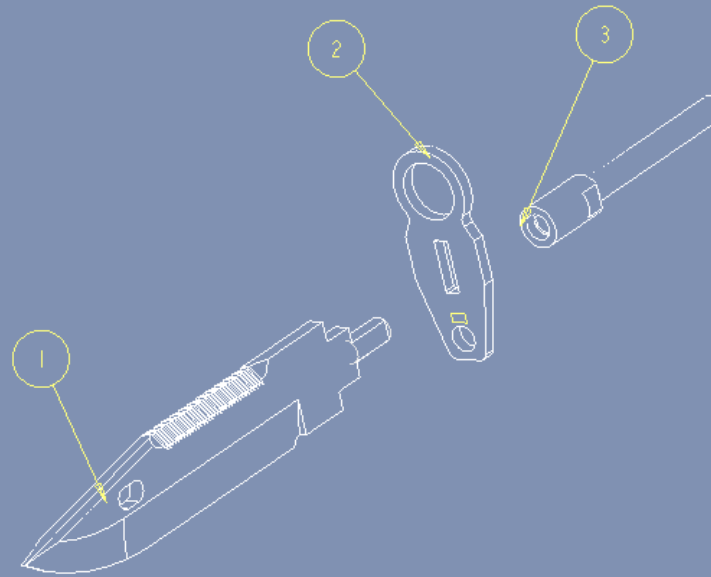
3D SOLID MODELS ALLOW AUTOMATED CREATION OF TECHNICAL MANUAL PAGES



(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGE CODE	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
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2		NONE	19200	12598164	GUARD	1
3		NONE	19200	12598165	ROD, TANG EXTENDING	1

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3D SOLID MODELS ALLOW AUTOMATED CREATION OF TECHNICAL MANUAL PAGES

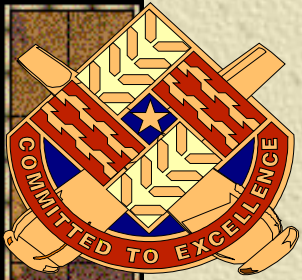


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1		NONE	19200	12598163	BLADE	1
2		NONE	19200	12598164	GUARD	1
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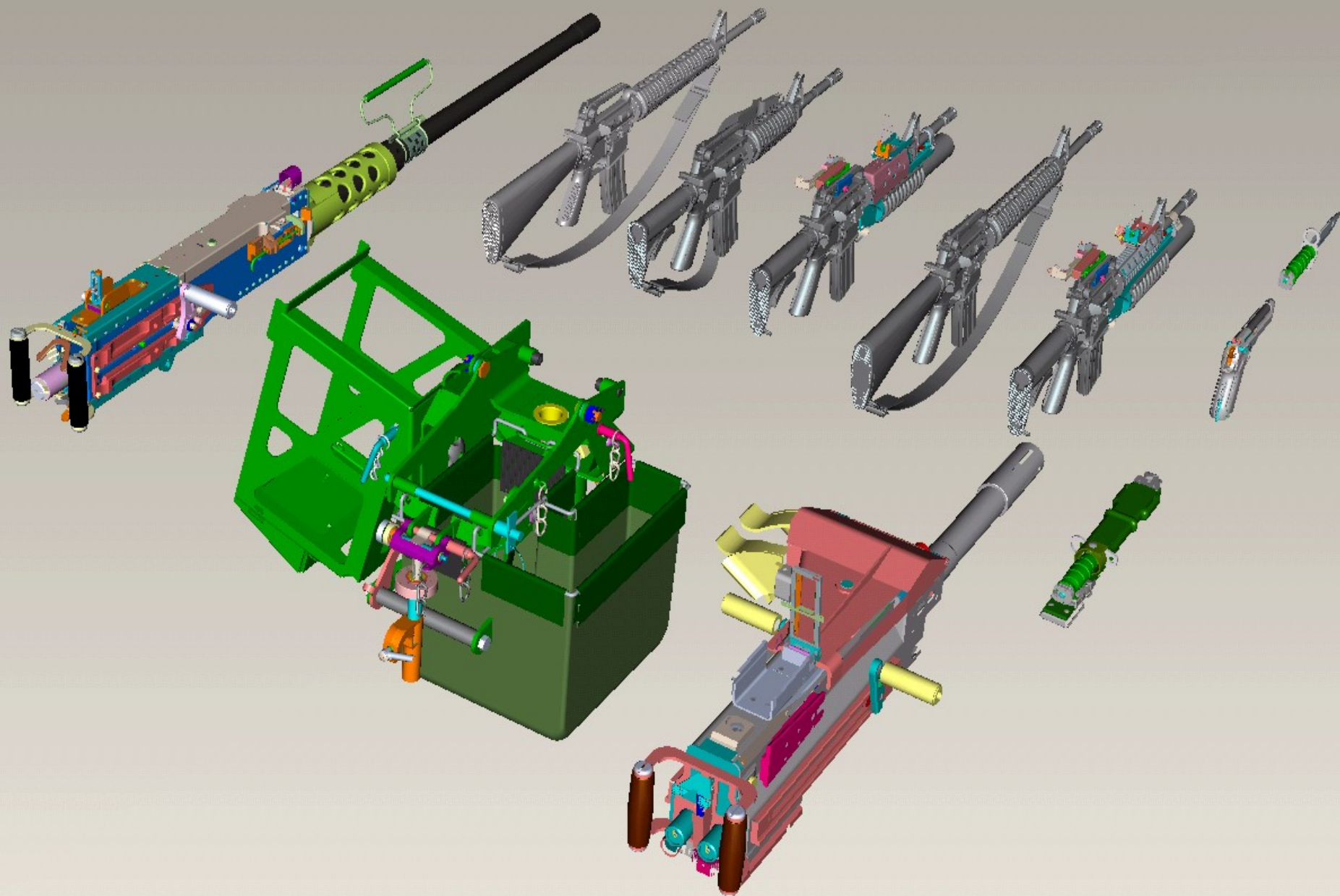
Advantages of 3D TDP's

- ✦ **Faster design upgrades**
- ✦ **Build virtual parts and assemblies in the computer**
- ✦ **Infinite viewpoints and exploded views of assemblies**
- ✦ **Reduced manufacturing lead time and cost**
- ✦ **Automated generation and update of line drawings**
- ✦ **Engineering analysis capabilities (stress, thermal, interference fit, tolerance stack-up, etc.)**
- ✦ **Rapid prototyping**

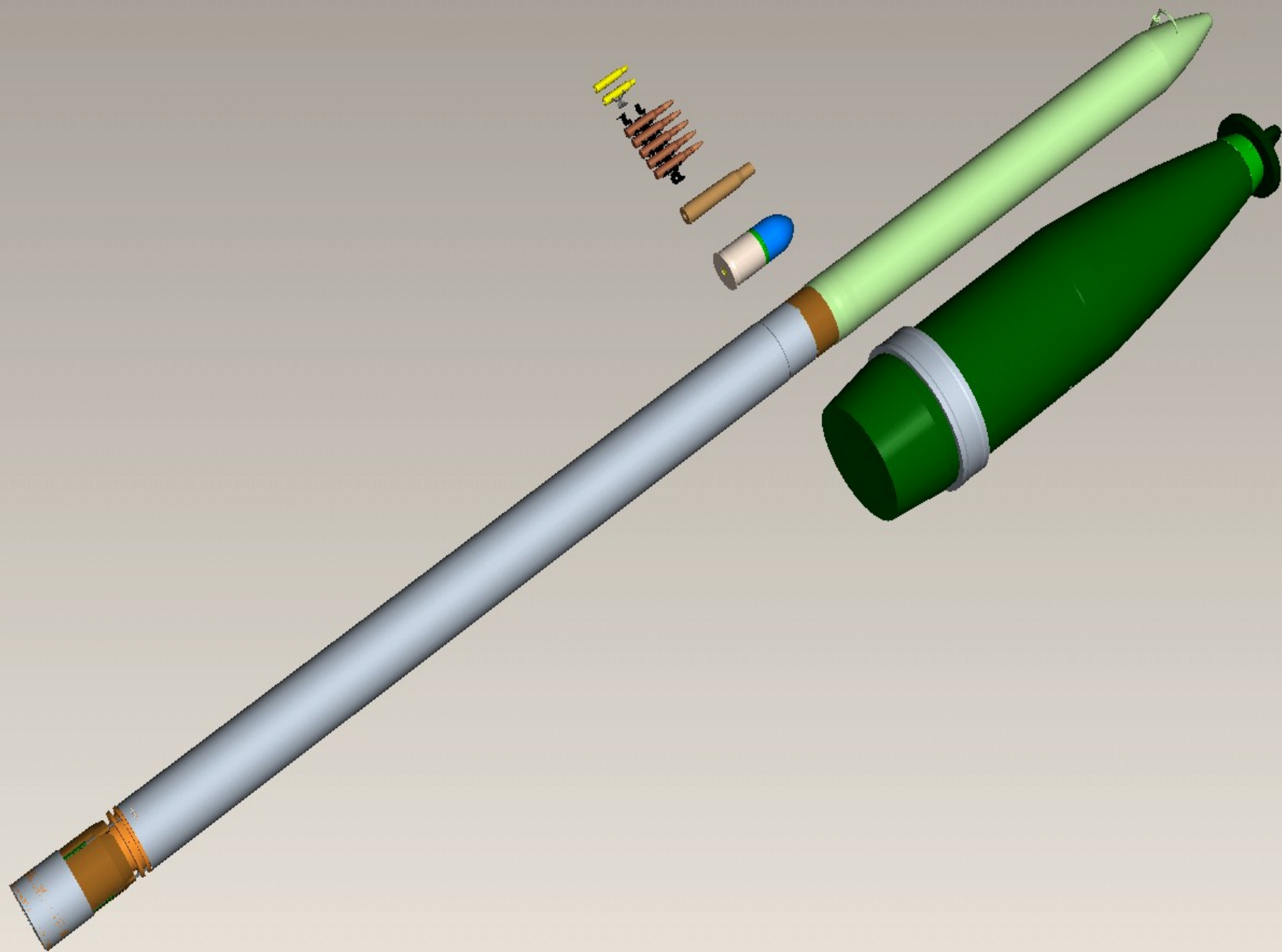


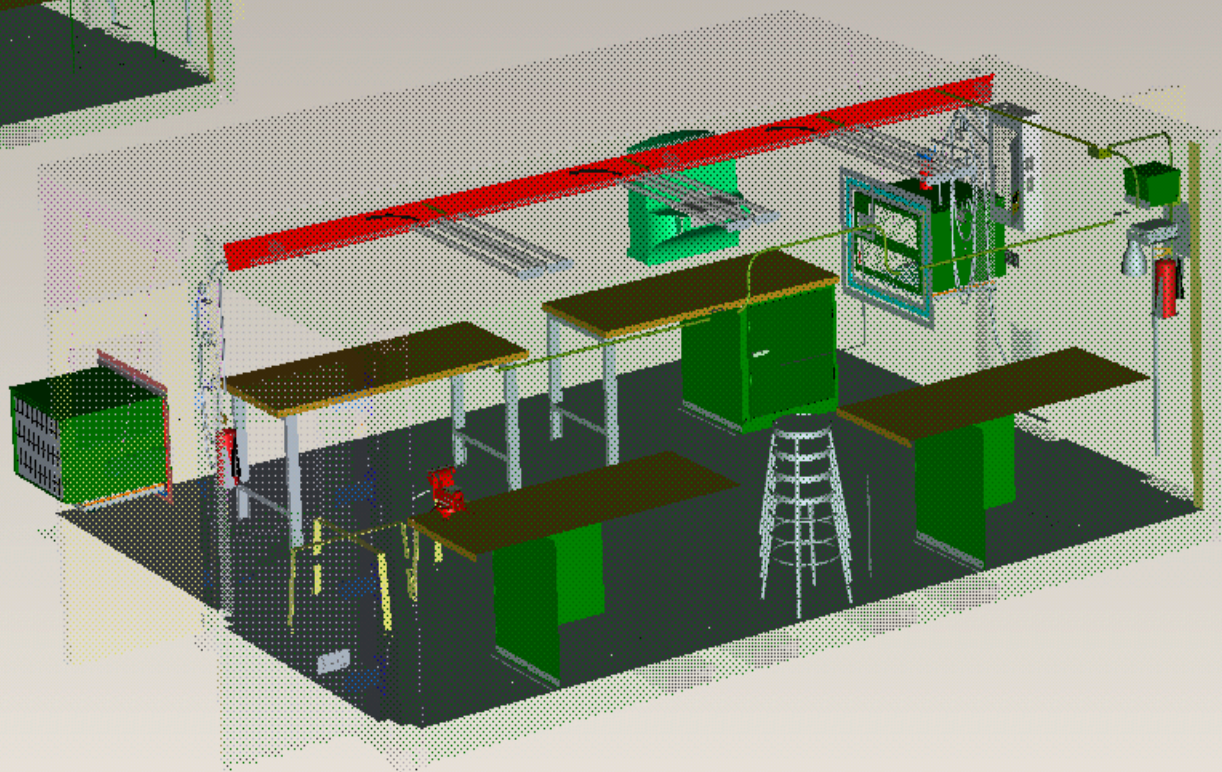
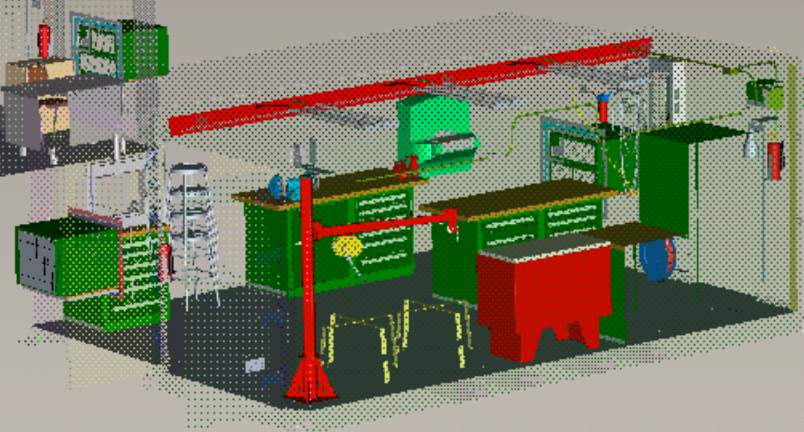
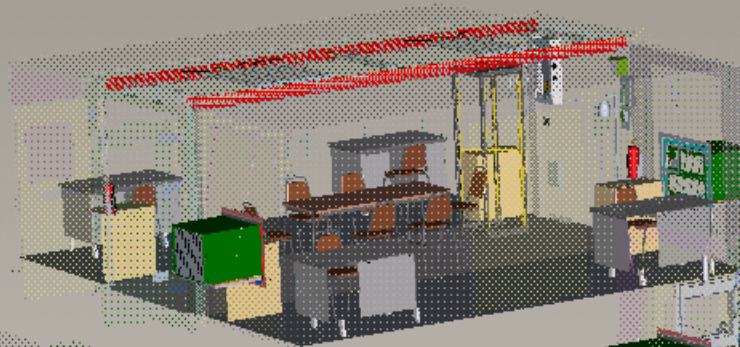
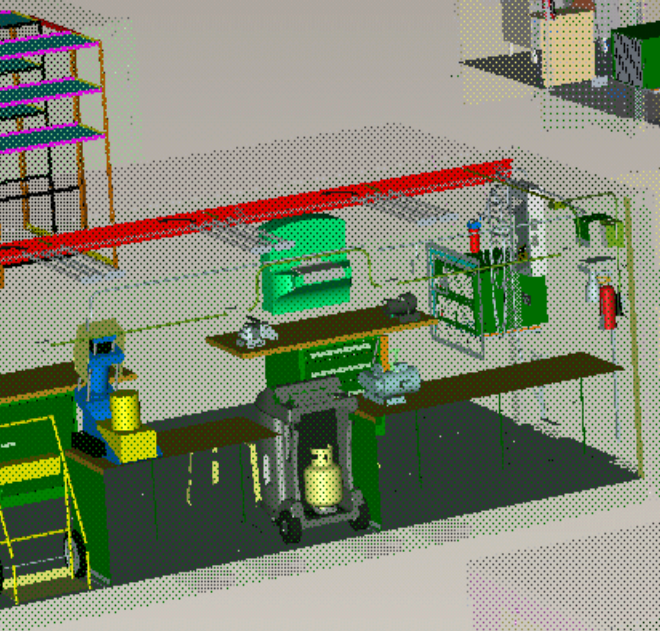
GETTING TO A 3D ENVIRONMENT

- ✦ Convert current weapon/ammo systems when it makes good business sense.
- ✦ Obtain future system's technical data in 3-D format.
- ✦ Low priority legacy systems will continue using 2D system.
- ✦ Performance specs (I.e. no tech data of any form) still an option when it makes sense.



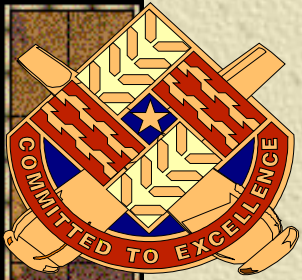






TACOM/ARDEC 3D-TDP Policy

- ✦ **Establishes 3D solid model tech data as the preferred technical data format.**
- ✦ **ARDEC Policy signed by Geza Pap July 02.**
- ✦ **TACOM Policy signed by MG Thompson Mar 03.**
 - ◆ *“TACOM managers will ensure (3D) technical data is implemented to the maximum extent possible ...”*
 - ◆ *“Sole use of 2D based technical data for products in development is strongly discouraged ...”*



CHALLENGES

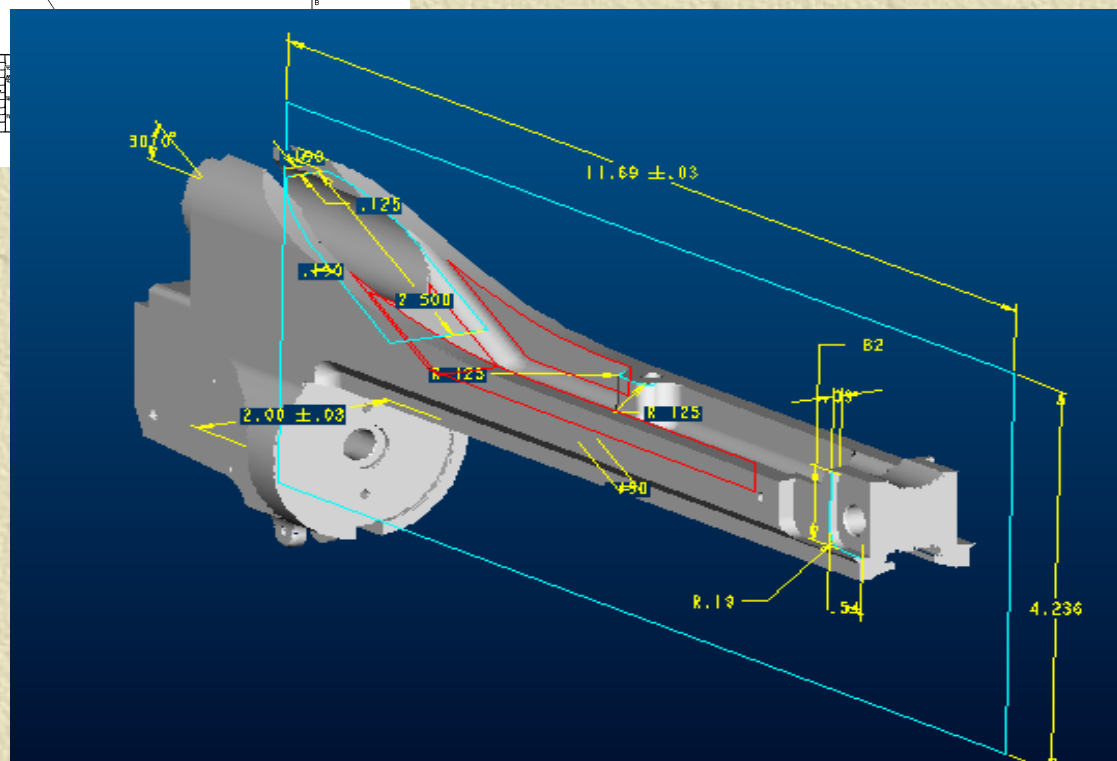
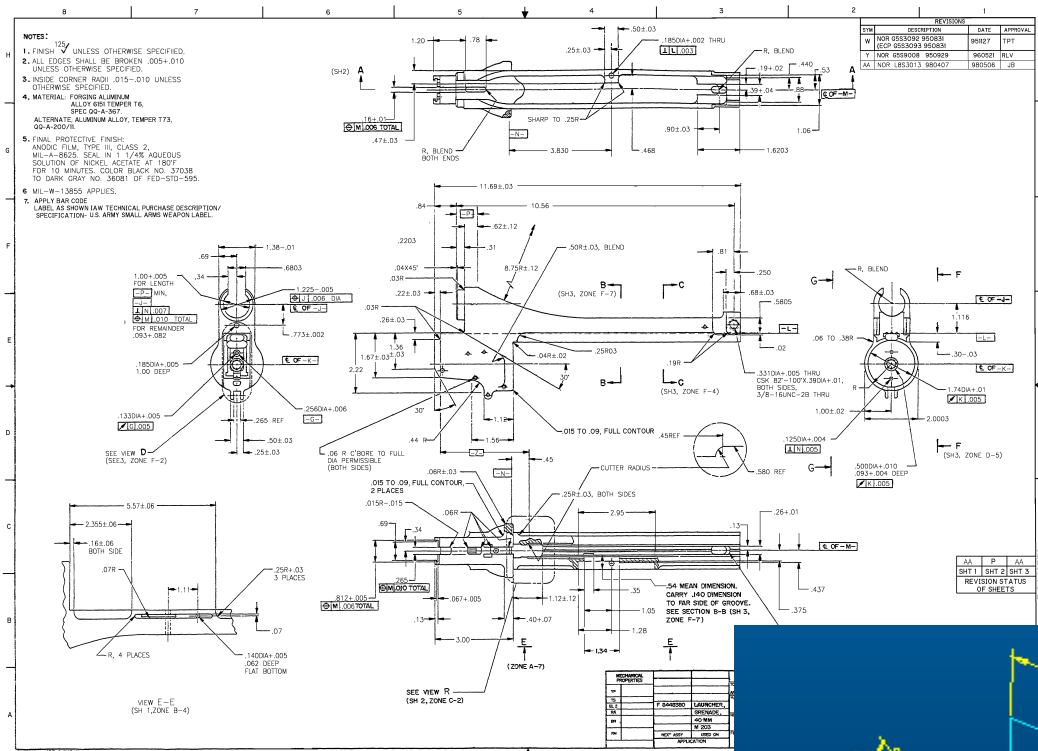
✦ CAD System interoperability:

- Pro/E Catia
- Unigraphics Solidworks
- Solid Edge Mechanical Desktop/Inv

✦ Training.

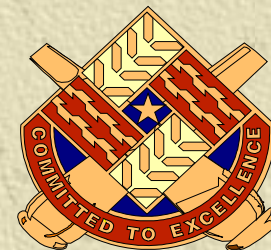
✦ Most ARDEC Engineers not using modeling standards and storing models off-line.

✦ Interface with DLA and other services.





Lethality, Survivability, Mobility and
Sustainment for America's Army



For more information contact:

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Windhamj@ria.army.mil

http://w4.pica.army.mil/ardec-ri/tacom_3d.htm

◆ **BACKUP CHARTS**

3D Technical Data Package (TDP) CD-ROMs

✦ 2 CDs are provided with each 3D TDP request

✦ The information on these CDs is presented in 6 formats which are:

- First CD {
1. Adobe Acrobat Portable Document Format (PDF) files
 2. JEDMICS .C4 Raster Images (contractual TDP)
 3. Pro/E 2-Dimensional line drawings

**(contractual
TDP)**

Second
CD {

4. Virtual Reality Markup Language (VRML) representation of solid models
5. Standard Format for the Exchange of Product Data (STEP) format representation of solid models
6. Pro/Engineer solid Models

✦ Technical Data Package List (TDPL) and Read-me files are also provided on each CD

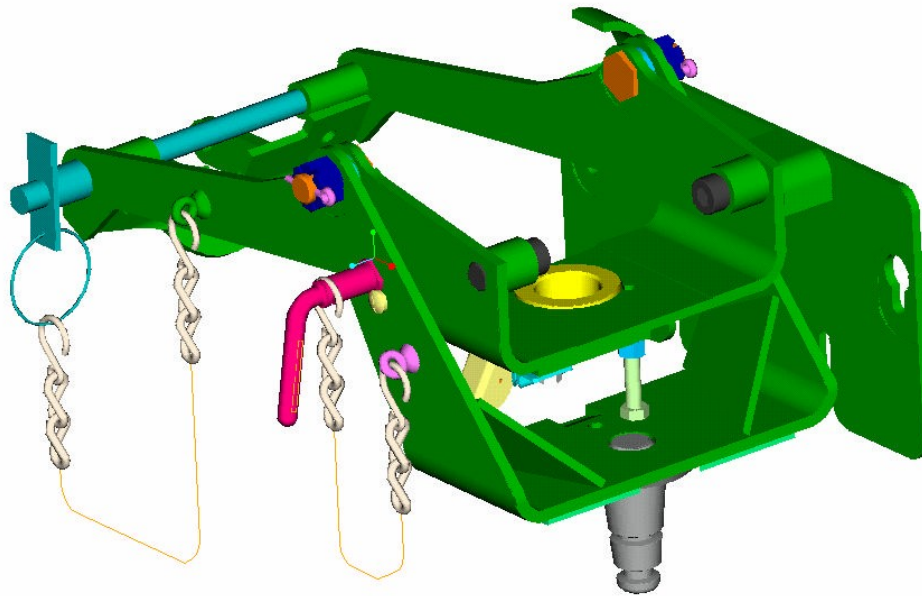
3D Technical Data Package (TDP) CD-ROMs (cont)

- ✦ First CD is a JEDMICS generated CD that provides raster images (.C4 and .PDF files)
- ✦ Contractor must adhere and comply with the technical data provided in this CD
- ✦ First CD contains software (ImageR, IndexR) and additional acquisition relative information

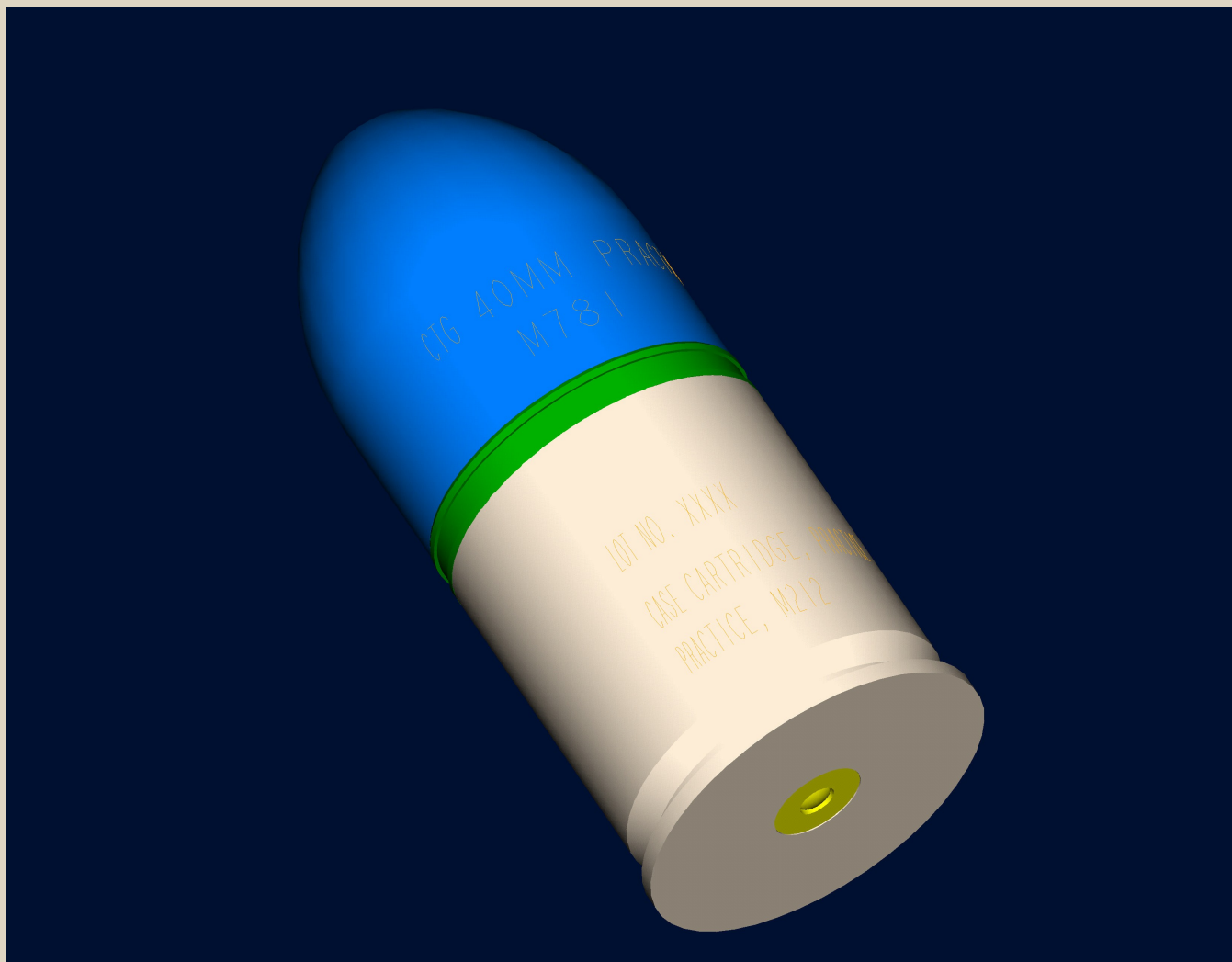
3D Technical Data Package (TDP) CD-ROMs

- (cont.)
- ✦ Second CD contains the Pro/E solid models, the 2D (from the 3D models) drawings, VRML and STEP files
 - ✦ The second CD also contains links to commercial sources to obtain viewers for the different formats provided
 - ✦ The second CD is provided to the contractors for information purposes only

Small Arms Mounts



40mm M781 Cartridge



M9 Pistol & Mk19 Grenade Launcher



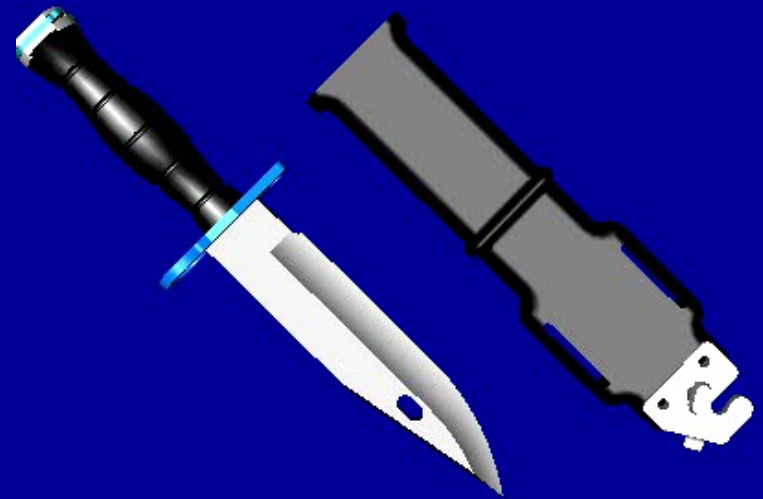
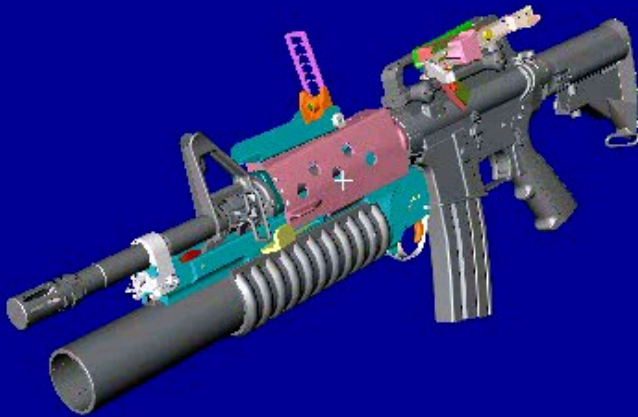
M4 Carbine/ M203 Grenade Launcher/ M9 Bayonet

USMC POSSIBLE CHANGES TO
M9 BAYONET:

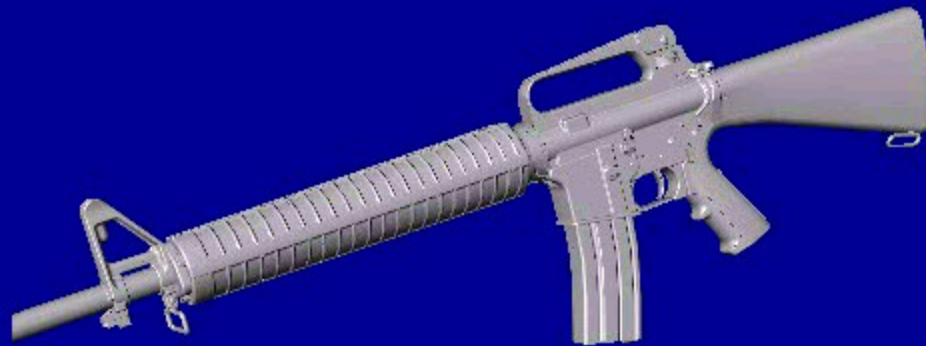
K-BAR STYLE HANDLE

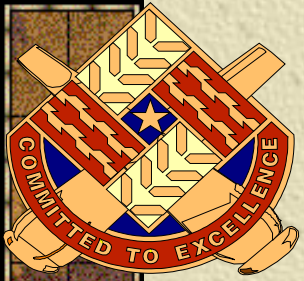
BLACK HANDLE AND SCABBARD

REMOVE SAW TEETH



M240 MG & M16 Rifle





Tech Data Formats

✦ Tech data will be delivered in 5 formats:

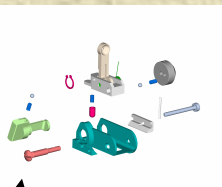
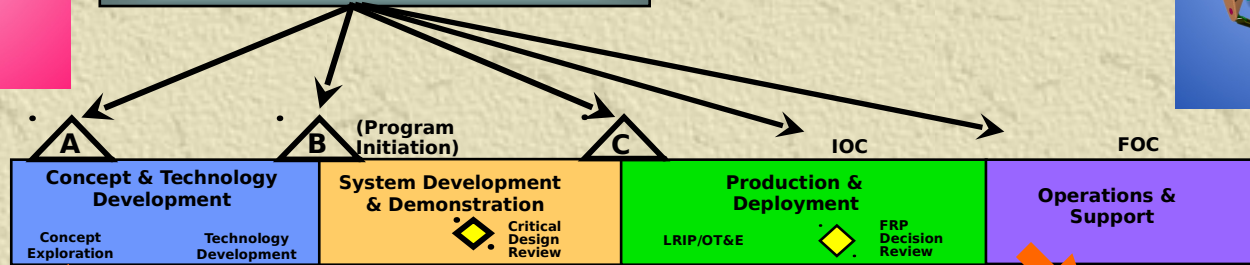
- Pro/ENGINEER native solid models
- Pro/ENGINEER native drawings
- VRML file of solid models
- STEP file of solid models
- Adobe acrobat (.pdf) drawings
(contractually binding)

Factors	Weight	Low	Medium	High	Remarks
1. System Density					
2. Future Production Quantities					
3. Remaining Lifecycle					
4. Interface with other Systems					
5. Mechanical Content					
6. Potential Design Changes					
7. Availability of the TDP					
8. Quality of the TDP					



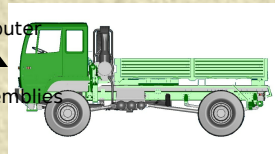
3D Tech Data Usage in the Lifecycle

3D Solid Model TDP Benefits thru the Lifecycle



Concept Exploration

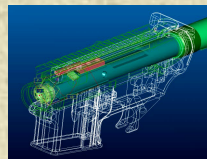
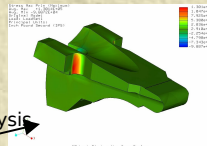
- Build virtual parts and assemblies in the computer
- Explore multiple design alternatives
- Infinite viewpoints and exploded views of assemblies
- Virtual Reality Simulation
- Reduces analysis and simulation time
- Create rapid prototypes



System Development

Better and faster engineering analysis

- Stress analysis
- Mechanism design
- Interference fit
- Tolerance stack-up
- Fatigue analysis



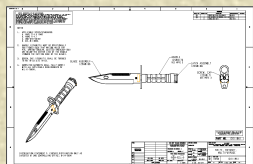
Design optimization

Improved interface with other systems

Automated generation and update of line drawings

Automated bill of material

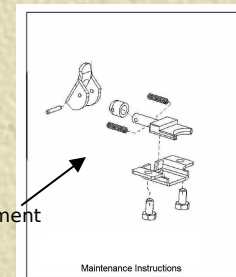
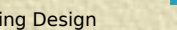
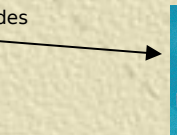
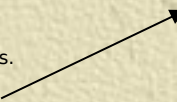
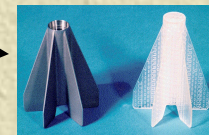
Generate near perfect TDP



Production and Deployment

Faster and better manufacturing (reduced ALT & PLT)

- Process Planning
- Assembly Planning
- Reduced TDP interpretation errors.
- Tooling design
- Models used to generate CNC codes
- Investment casting
- Mold Design
- Sheetmetal Design
- Routed Systems, Piping and Cabling Design



Sustainment

- Technical manual development
- Maintenance training
- Faster design upgrades
- Less time to update drawings
- Increase competition in re-procurement
- Save money on spare part purchases and complete re-buys
- Better and faster problem analysis

3D TDP Training Requirements

3D TDP Training Course	Training Hours	Training Source
Basic Pro/E	40	In-house, contractor, local
Fundamentals of Drawings	24	In-house, contractor, local
TACOM Modeling Standards	24	In-House
Intralink for Users	16	In-House
Advanced Drawings	40	In-house, contractor, local
Fundamentals of Sheetmetal	24	In-house, contractor, local
Advanced Surfacing	24	Contractor

New Course “3D Solid Modeling for Logisticians” being developed.

Pro/INTRALINK

Pro/INTRALINK is the database management tool for Pro/ENGINEER files. Features

- **include:**
 - **Storage of solid model data**
 - **Controlled distribution of data**
 - **Configuration management tools**
 - **Lifecycle management tools**
 - **Change control (ECP's etc.)**



Folders on M9 Pistol

- Root Folder
 - AIRCRAFT
 - AMMUNITION
 - ARMAMENT
 - Aircraft
 - Artillery
 - Medium Caliber
 - Small Arms
 - M16 Rifle Series
 - M2 Machine Gun
 - M203 Grenade Lau
 - M240 Machine Gun
 - M249 SAW
 - M9 Bayonet
 - M9 Pistol
 - MK 19 GMG
 - Tanks
 - AUTOMOTIVE
 - CHEMICAL & BIOLOGICAL
 - COMMUNICATION
 - DUMPSTER
 - LIBRARIES
 - MISSILES
 - PROE TRAINING
 - SHRINKWRAPS
 - SOLDIER SUPPORT
 - SUPPORT

Contents of /Root Folder/ARMAMENT/Small Arms/M9 Pistol

Name ▲ 1	Revision	Version	Release Level	Nomenclature	Branch	Status Description
19200_9346422.asm	-	0	PRODUCT WIP	BARREL ASSEMBLY	main	
19200_9346422.drw	A	0	PRODUCT WIP	--	main	
19200_9346424.drw	C	0	PRODUCT WIP	--	main	
19200_9346424.prt	-	0	PRODUCT WIP	PLUNGER, LOCKING BLOCK	main	
19200_9346425.drw	G	0	PRODUCT WIP	--	main	
19200_9346425.prt	-	0	PRODUCT WIP	BLOCK, LOCKING	main	
19200_9346426.drw	K	0	PRODUCT WIP	--	main	
19200_9346426.prt	-	0	PRODUCT WIP	BARREL, PISTOL	main	
d63477.prt	-	0	PRODUCT WIP	PIN, SPRING	main	



Name: 19200_12011994.prt

Description:

Created By:

Created On:

Branch: main

Revision:

Version: 0

Release Level: PRODUCT WIP

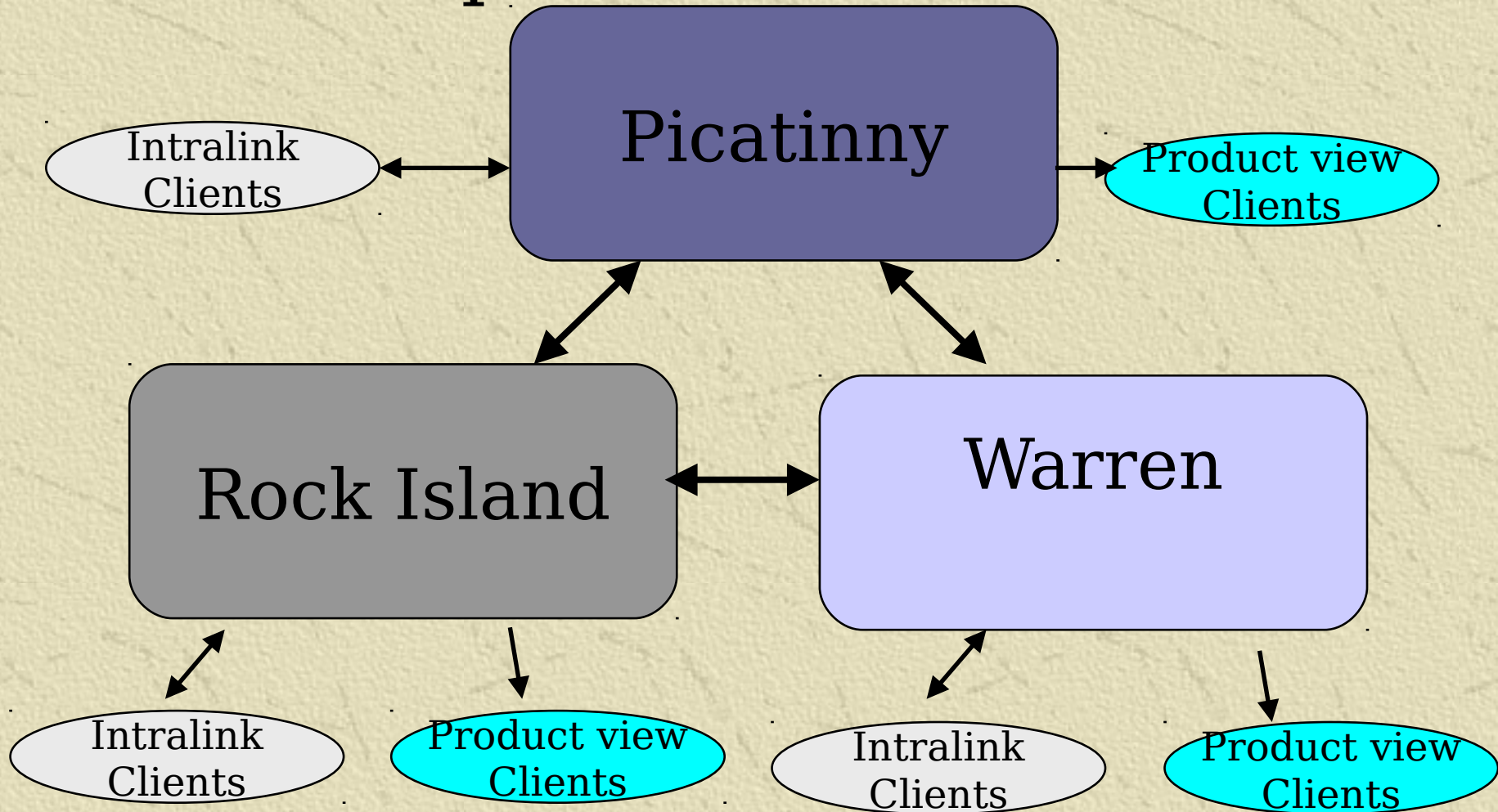
User State:

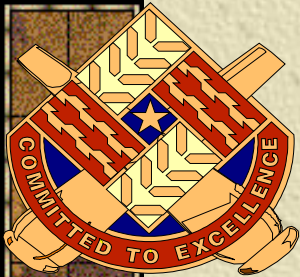
Object State: Generic ☐ Instance ☐ New ☐ Modified ☐ Read Only ☐



Attribute	Value
Agency	US ARMY
Cage_Code	19200
Casting	
Catalog_Nomenclature	
Checker_Name	(REQUIRED)
Contract_Number	
Current_Cage_Code	
Design_Activity	ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
Design_Activity_Location	PICATINNY ARSENAL, NEW JERSEY 07806-5000
Design_Approval_Date	YEAR-MM-DD
Design_Approval_Name	(REQUIRED)
Design_Contractor	
Distribution_Code	F
Drawing_Approval_Date	YEAR-MM-DD
Drawing_Approval_Name	(REQUIRED)
Drawing_Date	2000-06-05
Drawing_Rev	
Drawn_By	T. KULIG - ESERV
Engineer_Name_1	J. WINDHAM
Engineer_Name_2	L. KO
Eng_Esp_Approval	

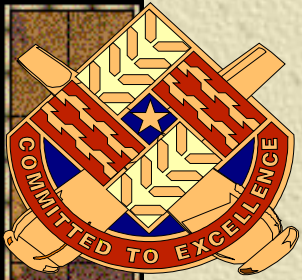
Intralink Server-Client Map





3D/TDP Outline

- ✧ 7 release levels
- ✧ File folder scheme by system
- ✧ 58 parameters maintained in model
- ✧ All parts in the pre-production release and production release must have fully defined 2-D line drawings
- ✧ 3D/TDP parts will be master for CM purposes
- ✧ Jedmics/BA viewer will remain. Source data will be 3D/TDP drawing.



3-D/TDP Outline

- ✦ Every engineering change will result in a new revision level and vice versa
- ✦ Engineers will incorporate changes to their parts (when possible).
- ✦ Centralized check against standards will remain.
- ✦ Information on drawing such as tolerances, materials, notes etc. Will source from solid model.

